

8.—This depression was central off the south coast of Newfoundland on the 26th, whence it moved northeastward to the thirty-first meridian by the 28th, and during the 29th and 30th passed slowly eastward in about latitude N. 55° to the twentieth meridian. This depression was attended by storms of considerable strength, and on the 27th gales attaining hurricane force were reported over mid-ocean.

## FOG IN NOVEMBER.

The following are limits of fog-areas on the north Atlantic Ocean, west of the fortieth meridian, for November, 1889, as reported by shipmasters:

Date.	Entered.			Cleared.			Date.	Entered.			Cleared.		
	Lat. N.	Lon. W.		Lat. N.	Lon. W.			Lat. N.	Lon. W.		Lat. N.	Lon. W.	
2	37 05	75 29		37 09	75 19		22	46 33	52 35		45 53	54 45	
5	46 42	47 24		46 50	40 50		22-23	47 10	44 30		45 02	51 53	
12	38 40	74 58		38 28	74 49		23	45 03	55 48		44 54	56 09	
13	37 26	75 09		37 12	75 30		25	48 34	48 30		48 12	49 11	
13-14	41 05	69 04		40 48	70 34		26-27	46 40	47 39		45 55	49 31	
20	41 08	66 10		41 05	66 20		29	46 05	55 45		45 30	59 15	
22	45 12	48 11		44 10	52 17		30	46 00	47 00		45 30	48 30	

The limits of fog-belts, west of the fortieth meridian, are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on seven dates; between the fifty-fifth and sixty-fifth meridians on two dates; and west of the sixty-fifth meridian on five dates. Compared with the corresponding month of the last two years the dates of occurrence of fog near Newfoundland in November, 1889, were two in excess of the average; between the fifty-fifth and sixty-fifth meridians three less than the average; and west of the sixty-fifth meridian five less than the average. Over and near the Banks of Newfoundland dense fog was reported on the 5th, 22d, 23d, 25th to 27th, and 30th, with the approach or passage to the northward of areas of low pressure.

Between the fifty-fifth and sixty-fifth meridians fog was reported on the 23d and 29th, with the presence to the northward of areas of low pressure. West of the sixty-fifth meridian fog was reported on the 2d, with south to east winds and high pressure; from the 12th to 14th, with rapidly falling barometer and easterly winds, attending the advance from the southwestward of an area of low pressure; and on the 20th, with south to east winds, attending a depression to the westward.

## OCEAN ICE IN NOVEMBER.

On chart i the positions of icebergs reported for the month are shown by ruled shading:

Ocean ice has been reported for November, 1889, as follows:  
1st.—N. 46° 47', W. 48° 00', two small bergs and thirteen smaller pieces in the immediate vicinity; N. 52° 30', W. 53° 16', a large berg; N. 52° 58', W. 51° 14', a large berg.

3d.—N. 52° 01', W. 54° 25' to N. 52° 37', W. 51° 58', four bergs.

4th.—N. 46° 47', W. 48° 27', a small berg.

5th.—N. 52° 06', W. 54° 08' to the Straits of Belle Isle, several large bergs.

7th.—N. 51° 36', W. 54° 55', a large berg; in the Straits of Belle Isle, four bergs, apparently aground.

16th.—N. 44° 56', W. 49° 00', a berg three hundred feet high and eight hundred feet long.

In November, 1888, 1887, 1883, and 1882, no Arctic ice was reported near Newfoundland or the Grand Banks. In 1886 only one berg, fifty to sixty feet high, was reported, observed on the 2d in N. 45° 20', W. 45° 26'. In 1885 the only iceberg reported was observed in N. 48° 00', W. 51° 10'. In 1884 several icebergs were seen in N. 45° 56', W. 52° 38'. From the above it will be seen that during the last eight years there have been four years in which no ice was reported for November, and that for the current month the aggregate quantity reported greatly exceeded the average amount noted for the corresponding month of the last eight years.

## TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for November, 1889, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

For November, 1889, the mean temperature was highest over southern Florida, where the highest mean reading, 76°.0, was noted at Key West. The mean temperature was above 60° on the Atlantic coast south of the thirty-second parallel, in Florida, except at extreme northwestern stations, along the west Gulf coast and in the lower Rio Grande Valley, in extreme southwestern Arizona, and in California south of the thirty-fifth parallel, and the mean temperature was generally above 50° south of a line traced from the middle Virginia coast irregularly west-southwest to extreme western Texas, and west of a line traced from southeastern Arizona northwestward to and along the immediate north Pacific coast to the mouth of the Columbia River. The mean temperature was lowest in the British Possessions north of Minnesota and North Dakota, the lowest mean reading, 20°, being noted at Minnedosa, Man. The mean readings were below 25° in the Valley of the Red River of the North and thence west of south to south-central South Dakota, over northern Minnesota, the northern part of

North Dakota, northeastern Montana, southeastern Wyoming, and central Colorado, and were below 40° north of a line traced from the east New England coast irregularly west-southwest to southern New Mexico, thence northwestward to northeastern California, and thence northward to the British Possessions.

In the United States the mean temperature was below the normal from the one-hundred and tenth meridian eastward to a line traced irregularly southeastward from Manitoba to the east Gulf coast. From the Valley of the Red River of the North eastward over the upper lake region and Canada; from the lower lake region southward over Florida; in the plateau regions; on the Pacific coast, and in the Canadian Northwest Territories the month was generally warmer than the average November. The departures below the normal temperature were greatest in central Texas and central Colorado, where they exceeded 5°. In districts where the mean temperature was above the normal the departures were less than 5°. The only station in the Atlantic coast states which reported mean temperature below the normal was Washington, D. C., where the deficiency was but 0°.8. Considered by districts the greatest average departure below the normal temperature, 4°.5, occurred on the southeastern slope of the Rocky Mountains; on the middle-eastern slope of the Rocky Mountains the average departure below the normal temperature was 4°.2; in the west Gulf states, 3°.8; in the upper Mississippi and Missouri valleys, 3°.2; in the Rio Grande Valley, 1°.8; on the northeastern slope of the Rocky Mountains, 0°.9; in the east Gulf states and over the southern plateau region, 0°.6; and in the Ohio Valley, 0°.2. The greatest average departure above the normal temperature, 3°.6, occurred on the south Pacific coast; on the middle Pacific coast the average departure above the normal tempera-

ture was 2°.4; in New England, 2°.3; on the north Pacific coast, 2°.2; in the south Atlantic states, 2°.0; in the middle Atlantic states, 1°.6; in the upper lake region, 1°.5; over the northern plateau region, 1°.4; in Florida and the lower lake region, 1°.2; and in the extreme northwest, 0°.4. In the middle plateau region the mean temperature averaged normal.

The following are some of the most marked departures from the normal at the older established Signal Service stations:

Above normal.		Below normal.	
Chatham, N. B.	5.0	Abilene, Tex.	6.2
San Diego, Cal.	4.0	Fort Elliott, Tex.	4.8
Winnipeg, Man.	4.0	Denver, Colo.	5.6
New Haven, Conn.	3.2	Saint Louis, Mo.	3.6
Portland, Oregon.	2.6	Fort Sully, S. Dak.	3.6

For the period from January 1 to November 30, 1889, there has been an average excess in temperature of 11° in New England; of 7° in the upper lake region; of 33° in the extreme northwest; of 8° in the Missouri Valley; of 18° on the northeastern slope of the Rocky Mountains; of 10° over the southern plateau region; of 5° over the middle plateau region; of 21° over the northern plateau region; of 22° on the north Pacific coast; of 14° on the middle Pacific coast, and of 11° on the south Pacific coast. On the south Pacific coast the mean temperature has been above the normal, except in May and July; on the north Pacific coast, except in August and September; on the middle Pacific coast, except in January, May, and July; over the northern plateau region, except in January, August, and September; over the middle plateau, except in January, February, and September (normal in November); over the southern plateau region, except in January, February, and November; on the northeastern slope of the Rocky Mountains, except in May, July, September, and November; in the Missouri valley, except in February, May to July, and September to November; in the extreme northwest, except in May to July, and September; in the upper lake region, except in February, May, June, September, and October, and in New England, except in February, July, August, and October (normal in September). For this period there has been an average deficiency in temperature of 5° in the middle Atlantic states; of 12° in the south Atlantic states; of 23° in the Florida Peninsula; of 18° in the east Gulf states; of 16° in the west Gulf states; of 14° in the Rio Grande valley; of 15° in the Ohio Valley; of 6° in the lower lake region; of 9° in the upper Mississippi valley; of 1° in the middle-eastern slope of the Rocky Mountains, and of 23° on the southeastern slope of the Rocky Mountains. In the middle Atlantic states the mean temperature has been below the normal, except in January, March to May, and November; in the south Atlantic states, except in January, April, May, and November; in the Florida Peninsula, except in November (normal in January); in the east and west Gulf states, except in January and April; in the Rio Grande Valley, except in January (July, August, October, and November normal); in the Ohio Valley, except in January, March, and April; in the lower lake region, except in January, March, April, and November; in the upper Mississippi valley, except in January, March, and April; on the middle-eastern slope of the Rocky Mountains, except in January, March, April, and August (normal in October), and on the southeastern slope of the Rocky Mountains, except in January, April, and October.

#### DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for November for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for November, 1889; (4) the departure of the current month from the normal; (5) and the extreme monthly means for November, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of Nov.	(2) Length of record.	(3) Mean for Nov., 1889.	(4) Departure from normal.	(5) Extreme monthly mean temperature for Nov.			
						Highest.	Year.	Lowest.	Year.
<i>Arkansas.</i>			Years						
Lead Hill.....	Boone.....	47.3	8	44.1	-3.2	50.0	1883	44.1	1889
<i>California.</i>									
Sacramento.....	Sacramento..	52.7	36	47.6	-5.1	57.5	1873	46.0	1886
<i>Colorado.</i>									
Fort Lyon.....	Bent.....	36.9	20	.....	.....	44.6	1867	19.6	1880
<i>Connecticut.</i>									
Middletown.....	Middlesex....	39.3	23	42.5	+3.2	45.1	1859	31.6	1873
<i>Florida.</i>									
Merritt's Island..	Brevard.....	66.1	5	68.3	+2.2	69.1	1884	60.0	1885
<i>Georgia.</i>									
Forsyth.....	Monroe.....	56.0	14	57.2	+1.2	59.0	1874	51.0	1880
<i>Illinois.</i>									
Peoria.....	Peoria.....	39.6	33	39.3	-0.3	44.6	1867	30.2	1880
Riley.....	McHenry.....	33.6	33	33.9	+0.3	40.3	1865	24.1	1880
<i>Indiana.</i>									
Vevay.....	Switzerland..	43.5	24	43.5	0.0	48.7	1879	33.0	1869
<i>Iowa.</i>									
Cresco.....	Howard.....	28.5	17	28.2	-0.3	34.7	1878	19.2	1880
Monticello.....	Jones.....	33.5	34	33.0	-0.5	41.5	1859	24.4	1863
Logan.....	Harrison.....	35.8	15	35.4	-0.4	41.2	1878	27.5	1880
<i>Kansas.</i>									
Lawrence.....	Douglas.....	40.0	21	38.2	-1.8	45.8	1878	31.6	1880
Wellington.....	Sumner.....	41.3	10	.....	.....	45.5	1879	29.0	1880
<i>Louisiana.</i>									
Grand Coteau.....	Saint Landry..	59.9	7	56.2	-3.7	64.0	1883	56.2	1889
<i>Maine.</i>									
Orono.....	Penobscot....	33.6	19	38.6	+5.0	38.6	1880	27.1	1875
<i>Maryland.</i>									
Cumberland.....	Allegany.....	39.8	30	41.8	+2.0	44.7	1883	32.7	1869
<i>Massachusetts.</i>									
Amherst.....	Hampshire....	38.2	53	42.2	+4.0	44.1	1849	29.7	1873
Newburyport.....	Essex.....	39.6	11	42.1	+2.5	42.1	1889	36.5	1880
Somerset.....	Bristol.....	40.3	17	45.2	+4.9	45.2	1889	33.0	1873
<i>Michigan.</i>									
Kalamazoo.....	Kalamazoo....	36.7	13	39.0	+2.3	41.0	1879	27.0	1880
Thornville.....	Lapeer.....	37.8	12	38.9	+1.1	45.4	1877	28.4	1880
<i>Minnesota.</i>									
Minneapolis.....	Hennepin.....	29.0	24	28.2	-0.8	36.3	1870	17.4	1880
<i>Montana.</i>									
Fort Shaw.....	Lewis & Clarke	33.2	21	37.3	+4.1	43.3	1867	19.9	1871
<i>New Hampshire.</i>									
Hanover.....	Grafton.....	34.0	52	36.8	+2.8	41.6	1849	24.8	1873
<i>New Jersey.</i>									
Moorestown.....	Burlington....	41.8	26	44.8	+3.0	45.3	1888	36.2	1873
South Orange.....	Essex.....	41.0	19	44.3	+3.3	44.5	1885	32.6	1871
<i>New York.</i>									
Cooperstown.....	Otsego.....	34.8	35	37.7	+2.9	38.5	1876, '77	26.8	1873
Pulver.....	Oswego.....	35.2	35	39.1	+3.9	41.9	1859	26.8	1873
<i>North Carolina.</i>									
Lenoir.....	Caldwell.....	44.9	17	47.0	+2.1	48.8	1878	39.9	1872
<i>Ohio.</i>									
N'th Lewisburgh..	Champaign....	39.3	57	40.6	+1.3	49.0	1849	29.0	1874, '80
Wauseon.....	Fulton.....	35.8	19	38.1	+2.3	40.3	1883	27.9	1880
<i>Oregon.</i>									
Albany.....	Linn.....	43.8	10	45.3	+1.5	47.4	1884	40.7	1880
Eola.....	Polk.....	42.7	19	49.6	+6.9	49.6	1889	37.6	1872
<i>Pennsylvania.</i>									
Dyberry.....	Wayne.....	34.6	21	37.8	+3.2	38.3	1883	25.7	1873
Grampian Hills..	Clearfield....	35.0	25	38.3	+3.3	39.1	1877	28.3	1869
Wellsborough.....	Tioga.....	38.9	10	38.3	-0.6	41.4	1885	37.2	1887, '88
<i>South Carolina.</i>									
Statesburgh.....	Sumter.....	53.6	8	54.3	+0.7	56.0	1883	51.2	1882
<i>Tennessee.</i>									
Austin.....	Wilson.....	47.6	19	49.6	+2.0	54.5	1879	40.2	1872
Milan.....	Gibson.....	47.3	6	46.0	-1.3	49.1	1883	45.5	1884
<i>Texas.</i>									
New Ulm.....	Austin.....	59.1	17	55.4	-3.7	65.6	1879	49.6	1880
<i>Vermont.</i>									
Stratford.....	Orange.....	33.1	16	37.1	+4.0	37.9	1886	23.4	1873
<i>Virginia.</i>									
Birdsnest.....	Northampton	49.6	21	51.6	+2.0	55.6	1881	43.0	1869
<i>Wisconsin.</i>									
Madison.....	Dane.....	33.1	20	33.4	+0.3	45.0	1864	23.4	1861
<i>Washington.</i>									
Fort Townsend..	Jefferson.....	42.6	14	45.0	+2.4	47.3	1884	39.2	1880

The above table shows that at Newburyport, Mass., eleven years record, the mean temperature for the current month, 42°.1, was 0°.6 higher than the highest mean temperature reported for November, noted in 1883; at Somerset, Mass., seventeen years record, the mean, 45°.2, was 0°.4 higher than the highest previous November mean, noted in 1885; at Orono, Me., nineteen years record, the mean, 38°.6, was 1°.5 higher than the highest previous November mean, noted in 1884; and at Eola, Oregon, nineteen years record, the mean, 49°.6, was 2°.9 above the highest mean for November of preceding years, noted in 1877.

At Lead Hill, Ark., eight years record, the mean for the current month, 44°.1, was 1°.1 lower than the lowest mean previously reported for November, noted in 1886 and 1888; and at Grand Coteau, La., seven years record, the mean for November, 1889, 56°.2, was 1°.2 lower than the lowest mean

recorded for the corresponding month of preceding years, noted in 1884.

#### MAXIMUM AND MINIMUM TEMPERATURES.

The highest temperature reported by a regular station of the Signal Service was 90°, at Micco, Fla. The maximum readings were above 80° from central North Carolina southward over eastern, central, and southern Florida, in the Mississippi Valley to about the thirty-third parallel, on the coast of southern Texas, in the lower Rio Grande valley, at Fort Elliott, Tex., and in southwestern Arizona and southern California. The lowest maximum temperature, 49°, was reported at Sault de Sainte Marie, Mich., and the maximum values were below 60° north of a line traced from the central coast of Maine westward over southern Ontario, thence southwestward to central Illinois, and thence northwestward to northern North Dakota, and within an area including the northern and a part of the middle plateau region, and the extreme north Pacific coast. The reports of United States Army post surgeons and state weather service and voluntary observers show maximum temperatures of 90°, or above, as follows: Casa Grande, Ariz., 94°; Cactus and Fresno, Cal., 90°; Manatee, Fla., 92°; Smithville, Ga., 94°; and Fort Ringgold, Tex., 91°. The following shows, by districts, the highest temperature reported at regular stations of the Signal Service for November of preceding years: New England, Boston, Mass., 75°, in 1876; middle Atlantic states, Washington, D. C., 80°, in 1879; Cape Henry, Va., 81°, in 1883; south Atlantic states, Augusta, Ga., 85°, in 1885; Florida Peninsula, Key West, Fla., 91°, in 1876; east Gulf states, New Orleans, La., 85°, in 1888; west Gulf states, Palestine and San Antonio, Tex., 87°, in 1888 and 1879, respectively; Rio Grande Valley, Rio Grande City, Tex., 92°, in 1883; Ohio Valley and Tennessee, Memphis, Tenn., 82°, in 1879; lower lake region, Sandusky, Ohio, 76°, in 1888; upper lake region, Chicago, Ill., 75°, in 1888; extreme northwest, Fort Yates, N. Dak., 76°, in 1887; upper Mississippi valley, Saint Louis, Mo., 82°, in 1879; Missouri Valley, Topeka, Kans., 82°, in 1887; northern slope of the Rocky Mountains, North Platte, Nebr., 81°, in 1887; middle slope of the Rocky Mountains, Fort Reno, Ind. T., 85°, in 1888; southern slope of the Rocky Mountains, Abilene, Tex., 86°, in 1885; southern plateau, Phoenix, Ariz., 97°, in 1884; middle plateau, Winnemucca, Nev., 71°, in 1887; northern plateau, Ashland, Oregon, 78°, in two or more years; north Pacific coast, Roseburgh, Oregon, 70°, in 1884; middle Pacific coast, Red Bluff, Cal., 80°, in 1887; south Pacific coast, Los Angeles, Cal., 88°, in 1884. At the following named stations of the Signal Service the maximum temperature for the current month was as high, or higher, than previously noted for November: Savannah, Ga., nineteen years record, 83°, 1° above maximum of 1875; Jacksonville, Fla., nineteen years record, 86°, 2° above maximum of 1875 and 1877; Vicksburg, Miss., eighteen years record, 85°, the same as maximum of 1885; Fort Canby, Wash., six years record, 66°, 2° above maximum of 1884; Neah Bay, Wash., five years record, 60°, 1° above maximum of 1885; Astoria, Oregon, five years record, 63°, 1° above maximum of 1885. The highest temperatures for November have been generally noted in New England and the east Gulf states in 1882 or 1888; in the middle Ohio valley, lower lake region, upper lake region, upper Mississippi valley, and middle eastern slope of the Rocky Mountains in 1888; in the extreme northwest, northeastern slope of the Rocky Mountains, and northern plateau region in 1887; in the Missouri Valley in 1887 or 1888; on the southeastern slope of the Rocky Mountains in 1885 or 1888; and on the north Pacific coast in 1884. In districts other than those named the periods of occurrence were irregular.

The lowest temperature reported by a regular station of the Signal Service was -28°, at Fort Buford, N. Dak. The temperature fell below zero over a greater part of Minnesota and the Dakotas, northern Nebraska, and northeastern and north-central Montana. The minimum temperature fell below 10°

from the upper lake region westward, north of the thirty-ninth parallel, to the one hundredth meridian, thence southwestward to south-central New Mexico, and over a greater part of the more eastern portions of the middle and northern plateau regions, except in the valleys of the Snake and Columbia rivers, and the minimum readings fell below 30° along the Atlantic coast to the thirtieth parallel; in the Gulf States, save along the immediate Gulf coast; over the Rocky Mountain and plateau regions, except in southeastern Arizona and the adjoining part of California; in Washington and Oregon, except along the coast, and in eastern California north of the thirty-seventh parallel. The highest minimum temperature, 60°, was reported at Key West, Fla., and the minimum values were above 40° over Florida south of the twenty-seventh parallel; on the California coast south of the fortieth parallel; and in the lower Colorado and lower Gila valleys. The reports of United States Army post surgeons and state weather service and voluntary observers show minimum temperature of zero, or below, as follows, the readings being the lowest noted in the several states and territories where the temperature fell to, or below, zero: Frazer and Breckenridge, Colo., -22° and -16°, respectively; Soda Springs, Idaho, -6°; Woodstock, Ill., -1°; Mauzy, Ind., zero; Wesley, Iowa, -9°; Chase, Mich., -4°; Pokegama Falls, Minn., -25°; Camp Poplar River, Mont., -23°; Fort Niobrara, Nebr., -12°; Berlin Mills, N. H., zero; Fort Buford, N. Dak., -28°; Wolsey, S. Dak., -10°; Weathersfield Centre, Vt., -3°; Greenwood, Wis., -5°; and Camp Pilot Butte, Wyo., -11°. The following shows, by districts, the lowest temperature reported at regular stations of the Signal Service for November of preceding years: New England, Eastport, Me., -13°, in 1875; middle Atlantic states, Albany, N. Y., -10°, in 1875; south Atlantic states, Wilmington, N. C., 20°, in 1872; Florida Peninsula, Cedar Keys, 27°, in 1887; east Gulf states, Atlanta, Ga., 16°, in 1887; west Gulf states, Little Rock, Ark., 10°, in 1880; Rio Grande Valley, Brownsville, Tex., 30°, in 1880; and Rio Grande City, Tex., 30°, in two or more years; Ohio Valley and Tennessee, Indianapolis, Ind., and Columbus, Ohio, -5°, in 1880; lower lake region, Oswego, N. Y., -1°, in 1875; upper lake region, Duluth, Minn., -29°, in 1875; extreme northwest, Saint Vincent, Minn., -30°, in 1887; upper Mississippi valley, Saint Paul Minn., -24°, in 1875; Missouri Valley, Valentine, Nebr., -32°, in 1887; northern slope, Fort Assiniboine, Mont., -30°, in 1887; middle slope, Denver, Colo., -18°, in 1877; southern slope, Fort Sill, Ind. T., -4°, in 1880; southern plateau, Santa Fé, N. Mex., -11°, in 1880; middle plateau, Montrose, Colo., -18°, in 1886; northern plateau, Fort Klamath, Oregon, 2°, in 1887; north Pacific coast, Roseburgh, Oregon, 18°, in 1880; middle Pacific coast, Red Bluff, Cal., 26°, in 1880; south Pacific coast, Fresno, Cal., 31°, in 1887. At the following named stations of the Signal Service the minimum temperature for the current month was as low or lower than previously reported for November: Augusta, Ga., seventeen years record, 24°, the same as minimum of 1873; Lava, N. Mex., five years record, 10°, 2° below minimum of 1886; Fort Thomas, Ariz., ten years record, 15°, 1° below minimum of 1880. The lowest temperatures for November have been generally noted in New England in 1875; in the middle Atlantic states and the lower lake region in 1875 or 1880; in the west Gulf states and the Ohio Valley in 1880 or 1887; in the upper lake region and on the middle Pacific coast in 1880; in the extreme northwest, Missouri Valley, middle slope, northern plateau, and north Pacific coast in 1887; in the southern plateau region in 1880 or 1886. In districts other than those named the periods of occurrence were irregular.

#### LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather for November, 1889, is shown on chart iv by a line traced from the eastern coast of Florida, in latitude about N. 29°, north of west over the western extremity of Florida to about the northern line of Louisiana east of the Mississippi River, and thence south of west to the Rio Grande Valley in the vicinity of Rio Grande

City, Tex. The western limit of freezing weather for the month is shown by a line traced from northwestern Washington southward, just east of the coast line, to western Oregon, where it touches the coast, and thence southeastward over northern and eastern California to southwestern Arizona.

#### RANGES OF TEMPERATURE.

The greatest and least daily ranges of temperature at regular stations of the Signal Service are given in the table of miscellaneous meteorological data. The greatest monthly ranges in temperature occurred in the western Dakotas and eastern Montana, where they were more than 70°, whence they decreased eastward to less than 40° on the New England and middle Atlantic coasts, southeastward to less than 30° over extreme southern Florida, southward to less than 40° on the east coast of Texas and less than 50° over the southern plateau region, and westward and southwestward to less than 30° on the north and middle Pacific coasts.

The following are some of the extreme monthly ranges :

Greatest.		Least.	
Fort Buford, Dak .....	89.0	Tatoosh Island, Wash .....	25.0
Fort Assiniboine, Mont.....	77.0	Key West, Fla.....	26.0
Valentine, Nebr.....	69.0	Point Reyes Light, Cal.....	27.0
Fort Elliott, Tex.....	64.0	Phoenix, Ariz.....	36.0
Columbia, Mo.....	60.0	San Diego, Cal .....	37.0

#### FROST.

On the 29th and 30th frost occurred as far south as northern Florida, and on the 30th was reported in central and western Florida to Lee county. The report of the Alabama state weather service states that the first killing frost of the season occurred in that state on the 29th and 30th, and that its occurrence was about ten days later than the average date of first killing frost. The report of the Mississippi weather service states that all vegetation was killed by the heavy frost on the 29th. In the west Gulf states and Texas frost was reported as far south as Brownsville, Tex., where it was noted on the 17th. Frost was reported on a number of dates in southern New Mexico and southern Arizona. On the Pacific coast frost was reported as far south as Los Angeles, Cal., where it was noted on the 6th, 7th, and 16th to 18th. Com-

pared with October, 1889, the southern limit of frost for the current month has extended nearly five degrees in the Atlantic coast states; about four degrees in Texas; and two to three degrees on the Pacific coast. For November, 1889, frost was reported in the south Atlantic and Gulf states, as follows: It was reported in the greatest number of states, nine, on the 29th; in eight on the 18th, 19th, and 30th; in seven on the 28th; in six on the 4th, 10th, 20th, and 23d; in five on the 3d, 15th to 17th, and 24th; in four on the 9th, and 12th to 14th; in three on the 11th, 22d, and 27th; in two on the 1st, 2d, 6th to 8th, and 21st; and in one on the 5th and 26th—the 25th was the only date on which no frost was reported in one or more of the south Atlantic or Gulf states. On the Pacific coast frost was reported in California on the 1st to 18th, and 23d to 25th; in Oregon on the 4th, 6th, 7th, and 14th to 16th; in Washington on the 1st, 3d to 6th, 13th to 16th, 18th, and 22d to 24th. Frost was reported on the greatest number of dates, twenty-four, in Louisiana; on twenty-one in California; on eighteen in Mississippi; on seventeen in North Carolina and Georgia; on fifteen in Alabama and Texas; on thirteen in Washington; on ten in South Carolina; on nine in Arkansas; on six in Oregon, and on four in Florida.

#### TEMPERATURE OF WATER.

The following table shows the maximum, minimum, and mean water temperature as observed at the harbors of the several stations; the monthly range of water temperature; and the mean temperature of the air for November, 1889:

Stations.	Temperature at bottom.				Mean temperature of air at the station.
	Max.	Min.	Range.	Monthly mean.	
Boston, Mass .....	51.1	44.3	6.8	48.2	44.6
Canby, Fort, Wash.....	56.0	48.5	7.5	52.2	50.1
Cedar Keys, Fla.....	76.3	48.9	27.4	68.1	64.3
Charleston, S. C.....	67.3	55.0	12.3	63.4	60.0
Eastport, Me.....	49.4	45.6	3.8	47.8	39.8
Galveston, Tex.....	74.0	55.5	18.5	62.4	59.6
Key West, Fla.....	81.5	69.7	11.8	77.6	76.0
Nantucket, Mass.....	54.0	43.5	10.5	48.9	46.1
New York, N. Y.....	52.1	45.9	6.2	50.0	46.9
Portland, Oregon.....	53.5	45.0	8.5	47.9	47.6

#### PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for November, 1889, as determined from the reports of nearly 2,000 stations, is exhibited on chart iii. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

The greatest monthly precipitation reported for November, 1889, was 16.25, at Heber, Ark. Monthly precipitation to equal or exceed ten inches was reported in Siskiyou, Shasta, and Placer counties, Cal., east-central Texas, east-central Pennsylvania, northeastern Maryland, northern New Jersey, west-central Connecticut, and extreme southeastern New York. At Hess Road Station, N. Y., a monthly precipitation of 15.23 was reported. On the Pacific coast the monthly precipitation was greatest along the lines of the Southern Pacific Railroad Company in north-central and northeastern California, where it amounted to 11.65 at Dunsmuir, Siskiyou Co., 11.41 at Emigrant Gap, Placer Co., and 10.03 at Delta, Shasta Co., and least in southern and southeastern California, where it was less than one-half inch, and where at Indio, San Diego Co., but 0.01 was reported. In the plateau regions the monthly precipita-

tion was greatest in northern and southeastern Idaho, northeastern Nevada, in areas in central Utah, and in south-central New Mexico, where it exceeded one inch, and where at Nogal, Lincoln Co., N. Mex., it amounted to three inches. In areas in the interior of Nevada, extreme northwestern Utah, and east-central Arizona no precipitation was reported. On the eastern slope of the Rocky Mountains the greatest amount of precipitation fell in central Colorado, where it exceeded four inches, and in extreme northwestern Wyoming, west-central Colorado, west-central Kansas, and north-central and extreme northern Texas, where it exceeded two inches. In Cheyenne county, Nebr., no precipitation was reported. In the central valleys the monthly precipitation was greatest in central Arkansas, where it varied in amount from ten to over sixteen inches, and least in the Dakotas, western Minnesota, and central Mississippi, where less than one-half inch fell, and where at stations in southeastern South Dakota trace was reported. In the Lake region the monthly precipitation exceeded five inches at stations in extreme south-central and southwestern Michigan and western New York, and was less than one inch on the west and northwest shores of Lake Superior. In the Atlantic coast states the monthly precipitation exceeded ten inches in areas in the middle Atlantic states and west-central Connecticut, and was less than one inch in north-central South Carolina, and extreme southwestern Georgia, and was less than one-half inch in central Florida.